

INTERNSHIP PROPOSAL

Laboratory name: Sciences et Ingénierie de la Matière Molle

CNRS identification code: 7615

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Internship location: ESPCI, 10 rue Vauquelin, Paris Ve

Thesis possibility after internship: YES

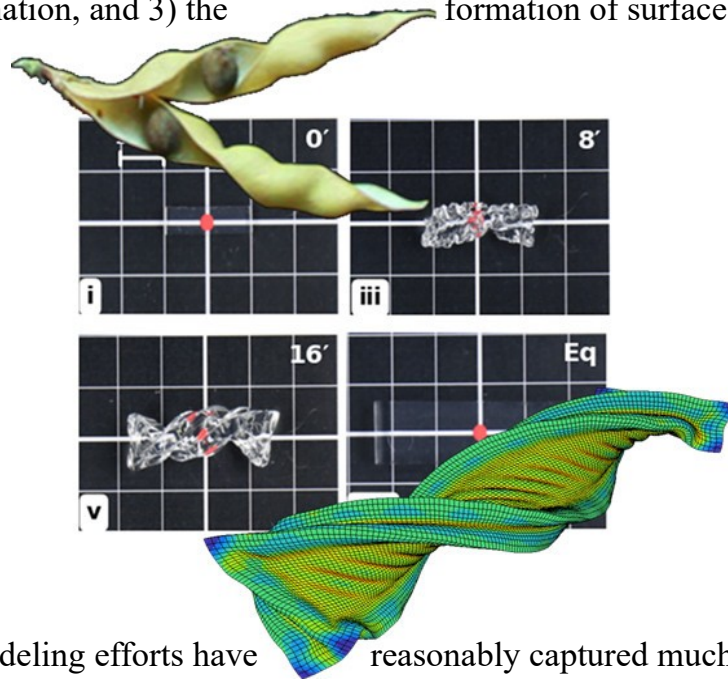
Funding: YES

If YES, which type of funding: ED

Turgor pressure & twist instabilities

Morphogenesis driven by gel swelling has been extensively studied since the 1970s, beginning with the classic case of surface creasing (cf the surface of dry goat cheese).

Recently, while developing new tough and bio-based gel formulations, we discovered a gel system that exhibits a remarkable and well-organized sequence of instabilities (see Figure): 1) the emergence of fringe patterns; 2) a macroscopic twisting deformation, and 3) the



Preliminary modeling efforts have reasonably captured much of this rich behavior, provided that specific material properties (notably diffusion characteristics) and boundary conditions (constant flux and not constant chemical potential) are taken into account. However, the physical origin and structural implications of these modeling assumptions remain unclear.

The goal of this internship is to establish a more systematic experimental and theoretical framework to elucidate the underlying physical mechanisms governing this remarkable morphogenetic process.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: NO Soft Matter and Biological Physics: YES

Quantum Physics: NO

Theoretical Physics: NO